

201944-009
586-1003-31A4-01
143-173
CLEAN VERSION OF CLAIMS

Please cancel pending claims 1-142 and add new claims 143-173.

1 143. (New) A method of manipulating a target nucleic acid contained in a sample, comprising:

- (a) providing a solid phase matrix, wherein said matrix is a specific binding material having one or more electropositive materials rendered hydrophilic; and
- (b) flowing said sample through or over said solid phase matrix, wherein said nucleic acid becomes tightly bound to said solid phase matrix.

2 144. (New) The method of claim 143, wherein said sample is flowed over said matrix at a rate between about 0.5 mL/min and 2mL/min.

3 145. (New) The method of claim 143, wherein step (a) further comprises:

- (i) contacting a probe comprising a nucleic acid sequence that is complementary to a specific sequence of said target nucleic acid with said solid phase matrix under conditions that allow said probe to become tightly bound to said matrix, and wherein during step (b) said sample is flowed through or over said solid phase matrix under conditions that allow said target nucleic acid to hybridize to said probe to form a complex.

4 146. (New) The method of claim 143, wherein said sample contains non-nucleic acid contaminants and said method further comprises:

- (c) washing said matrix-bound nucleic acid one or more times with a wash buffer to remove said non-nucleic acid contaminants to provide a purified nucleic acid tightly bound to said matrix.

5 147. (New) The method of claim 146, wherein said wash buffer is selected from the group consisting of water, 70% ethanol, polymerase chain reaction buffer, TRIS buffer, EDTA buffer, lithium chloride, and guanidium detergent based buffer.

6 148. (New) The method of claim 146, further comprising:

- (d) incubating said matrix-bound purified nucleic acid in a displacement buffer, wherein a small amount of said purified nucleic acid is displaced from said matrix into said displacement buffer; and
- (e) amplifying one or more target nucleic acid sequences of said displaced purified nucleic acid.

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149. (New) The method of claim 148, wherein said displacement buffer is Tris/HCl buffer or water.

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150. (New) The method of claim 148, further comprising repeating steps (d) and (e) one or more times.

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151. (New) The method of claim 148, further comprising:
(c) contacting said matrix-bound target nucleic acid with a set of primer nucleic acid sequences and a buffer that allows said primer sequences to hybridize to said matrix-bound target nucleic acid; and
(d) amplifying said target nucleic acid to produce an amplified reaction mixture, wherein said target nucleic acid sequence remains tightly bound to said matrix.

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152. (New) The method of claim 151, wherein said amplification methodology is selected from the group consisting of PCR, SDA, NASBA, IsoCR, CRCA, Q beta replicase, branched chain DNA, RT-PCR, and unwinding coil amplification.

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153. (New) The method of claim 151, further comprising repeating steps (c) and (d) one or more times.

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154. (New) The method of claim 151, wherein said sample comprises two or more target nucleic acids and said two or more target nucleic acids are amplified in series.

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155. (New) The method of claim 151, wherein said target nucleic acid contains multiple target nucleic acid sequences, said method further comprising contacting said matrix-bound target nucleic acid in step (c) with multiple primer sets to pre-amplify said multiple target sequences, wherein said multiple target sequences are amplified simultaneously.

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156. (New) The method of claim 155 wherein step (c) further comprises dividing said pre-amplified reaction mixture into a plurality of aliquots and adding at least one of said primer sets to each of said aliquots, wherein each of said aliquots is amplified according to step (d).

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157. (New) The method of claim 148, wherein said electropositive material comprises an element selected from the group consisting of aluminum, titanium, zirconium, hafnium, scandium, yttrium, lanthanum, vanadium, tantalum, chromium, molybdenum, tungsten, boron, gallium, indium, germanium, tin, and lead.

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158. (New) The method of claim 148, wherein said matrix is selected from the group consisting of alpha aluminum oxide, gamma aluminum oxide and an aluminum oxide thin-film of mixed composition.

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159. (New) The method of claim 148, wherein said matrix is Ti_2O_3 .

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160. (New) The method of claim ~~143~~, wherein said matrix is modified ZrO₂.

161. (New) The method of claim ~~143~~, wherein said nucleic acid is selected from the group consisting of double stranded DNA, single stranded DNA, RNA, or PNA.

162. (New) The method of claim ~~143~~, wherein said nucleic acid is double stranded DNA, and step (b) further comprises adding a buffer that allows said DNA to be bound to said matrix as single stranded DNA.

21 163. (New) The method of claim ~~162~~, wherein said buffer is selected from the group consisting of guanidine thiocyanate-based buffers, alkaline buffers, lithium chloride, and detergent based buffers.

22 164. (New) The method of claim ~~143~~ wherein said sample contains both DNA and RNA, and step (b) is performed under conditions wherein said matrix exclusively binds said DNA.

23 165. (New) The method of claim ~~164~~, wherein said conditions comprise adding to said sample a buffer selected from the group consisting of guanidine thiocyanate-based buffers, alkaline buffers, lithium chloride, and detergent based buffers prior to contacting said sample with said solid phase matrix.

24 166. (New) The method of claim ~~164~~, wherein said conditions comprise adding to said solid phase matrix a buffer selected from the group consisting of guanidine thiocyanate-based buffers, alkaline buffers, lithium chloride, and detergent based buffers prior to contacting said sample with said solid phase matrix.

25 167. (New) The method of claim ~~143~~, wherein said sample contains both DNA and RNA, and step (b) is performed under conditions wherein said matrix exclusively binds said RNA.

26 168. (New) The method of claim ~~167~~, wherein said conditions comprise adding a DNA degrading reagent to said sample prior to contacting said sample with said solid phase matrix.

27 169. (New) The method of claim ~~168~~, wherein said DNA degrading reagent is DNase.

28 170. (New) The method of claim ~~143~~, wherein said sample comprises blood, stool, sputum, mucus, cervical fluid, vaginal fluid, cerebral spinal fluid, serum, urine, saliva, teardrop, biopsy samples, histological tissues, tissue culture products, bacterial cultures, swabs, agricultural products, environmental samples, waste water, drinking water, foodstuff, or air.

29 171. (New) The method of claim ~~143~~, wherein said solid phase matrix is coated on the surface of a substrate.

30 172. (New) The method of claim ~~171~~, wherein said substrate is a glass or polymeric

material.

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31 173. (New) The method of claim 171, wherein said substrate is in the shape of tubes, plates, membranes, capillaries, slides, beads, microparticles, fibers, microchannels, and microarrays.